South West Wood Products Ltd

Recycling Facility Berth 31, No. 2 Dock, Port of Barry

Chapter 8: Water Environment – Flooding and Surface Water

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Contents

Tables

8.1 Introduction

8.1.1 This Chapter considers the potential for the proposed development to impact upon the Marine Environment, Hydrology and Flood Risk at, or in the vicinity of, the application area.

8.1.2 The chapter also describes the scope, relevant legislation, assessment methodology and the baseline conditions currently existing within the application area and immediate locale. It then considers any potential significant environmental effects the proposed development would have on this baseline environment; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

8.2 Assessment Methodology

Approach

8.2.1 The assessment has involved the following:

- Detailed desk study to establish current baseline marine and hydrological conditions.
- Identification of possible measures to avoid and mitigate against any adverse impacts resulting from the proposed development.
- Evaluation of the residual significance of these impacts by consideration of the sensitivity of the baseline features of the application area, the probability of these impacts occurring and the potential magnitude of these impacts before and after mitigation.

8.2.2 The desk top study was undertaken in order to:

- Collect marine and hydrological information.
- Identify sensitive marine and hydrological features which may be impacted by development proposals.
- Describe the marine environment and surface water hydrology, including watercourses and springs within and adjacent to the application site boundary(ies).
- Identify flooding risks.
- Confirm surface water catchment areas and watersheds.

8.2.3 The extent of the desk top study was based on professional judgment.

Guidance

8.2.4 Relevant UK guidance on good practice for construction projects is detailed in the following documents:

- Control of Pollution Act 1974.
- Environment Act 1995.
- Natural Resources Wales statutory obligations over the management and control of pollution into water.
- EC Water Framework Directive (2000/60/EC).
- Control of Water Pollution from Construction Sites - Guide to Good Practice, CIRIA 2001.
- National SUDS Working Group, Interim Code of Practice for Sustainable Drainage Systems, 2004.
- Environmental Good Practice on Site C811, CIRIA 2023.
- Control of Water Pollution from Linear Construction Projects C649, CIRIA 2006.
- Control of Water Pollution from Linear Construction Projects – C648 (CIRIA, 2007).
- Flood and Water Management Act, 2010.
- Code of Practice for Site Investigations, BS5930 (2015).

8.2.5 Guidelines for surface water management and flood consequences assessment are as follows:

- Planning Policy Wales (2004 – revised 2021). Technical Advice Note 15: Development and Flood Risk.
- The SuDS Manual (Report C753). CIRIA, 2015.

Information Sources

8.2.6 The following sources of information have been consulted in order to characterise the marine environment and hydrology of the application area and immediate locale:

- BGS online maps (https://www.bgs.ac.uk/map-viewers/geology-of-britain-viewer/) for details of geology.
- BGS online maps (https://www.bgs.ac.uk/information-hub/borehole-records/) for borehole logs.
- Defra Magic website for details of Groundwater Vulnerability, Groundwater Source Protection Zones and UK Designated sites (marine, ground and surface waters).
- Natural Resources Wales. Development Advice Maps.

- Natural Resources Wales (Living Document). Flood Map for Planning (https://flood-map-for-planning.naturalresources.wales).
- Centre for Ecology and Hydrology Flood Estimation Handbook (FEH) Web Service, hydrometric data (https://fehweb.ceh.ac.uk/GB/map).
- UK Government Guidance (May 2022). Flood Risk Assessments: Climate Change Allowances (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#table-2).
- National Soils Resource Institute Website for details on soils (https://www.landis.org.uk/soilscapes/).
- Amber Planning Ltd. (2024). Flood Consequences Assessment: *Recycling Facility, Berth 31, Port of Barry*.
- Land & Mineral Management Ltd. (2024). Environmental Statement: *Recycling Facility, Berth 31, Port of Barry*.
- Topographical Survey (2024).

Policy Context

National Legislation and Policy

8.2.7 Key national legislation and policy relevant to this proposed development includes:

- Environmental Permitting (England and Wales) Regulations 2011 (Amendment).
- Environment Act 1995.
- The Environment Agency's (EA) / Natural Resources Wales's statutory obligations over the management and control of pollution into water.
- Defra's Environmental Permitting Guidance: Groundwater Activities, 2010.
- Environmental Permitting (England and Wales) Regulations 2010.
- The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 in England and Wales.
- Flood and Water Management Act, 2010.
- Planning Policy Wales (2004 – revised 2021). Technical Advice Note 15: Development and Flood Risk.

Local Planning Policy and Strategy

8.2.8 Key local policy relevant to the consideration of hydrology and flood risk includes:

- Vale of Glamorgan Council (2010). Shoreline Management Plan.
- Vale of Glamorgan Council (2017). Local Development Plan 2011-2026.

- Vale of Glamorgan Council Interactive Proposals Map.
- Vale of Glamorgan Council Planning Policy Page.
- Vale of Glamorgan Council (2009). Preliminary Flood Risk Assessment.
- Vale of Glamorgan Council (2013). Local Flood Risk Management Strategy.
- Vale of Glamorgan Council Flood and Coastal Erosion Risk Management (FCERM).
- Vale of Glamorgan Council (1996-2011). Barry Development Guidelines.

Significance Criteria

8.2.9 Qualitative risk assessment methodology has been used to assess the significance of the potential effects associated with the proposed development. Two factors have been considered using this approach: 1. The sensitivity of the receiving environment; and 2. The potential magnitude of impact, should that potential impact occur.

8.2.10 This approach provides a mechanism for identifying the areas where mitigation measures are required, and for identifying mitigation measures appropriate to the risk presented by the scheme. This approach also allows effort to be focused on reducing risk where the greatest benefit may result.

8.2.11 Criteria for determining the significance of effects are provided in Table 8.1, Table 8.2 and Table 8.3, below. Effects of **Major** and **Moderate** significance are considered to be **Significant** in terms of the EIA Regulations.

8.2.12 The sensitivity of the receiving environment (i.e. the baseline quality of the receiving environment, as well as its ability to absorb the impact without perceptible change), is defined in Table 8-1.

Table 8.1: Sensitivity Criteria for Marine and Water Environment Receptors

Sensitivity	Definition
Very High	**International importance** Receptor with a high quality and rarity, regional or national scale and limited potential for substitution / replacement.
High	**National importance** Receptor with a high quality, local scale and limited potential for substitution / replacement; or Receptor with a medium quality and rarity, regional or national scale and limited potential for substitution / replacement.
Medium	**Regional importance** Receptor with a medium quality and rarity, local scale and limited potential for substitution / replacement; or Receptor with a low quality and rarity, regional or national scale and limited potential for substitution / replacement.
Low	**Local importance** Receptor with a low quality and rarity, local scale. Environmental equilibrium is stable and is resilient to changes that are greater than natural fluctuations, without detriment to its present character.

8.2.13 The criteria used to assess the magnitude of the impacts are defined in Table 8.2.

Table 8.2: Magnitude of Impact Criteria and Definitions

Magnitude	Criteria	Definition
Major	Results in loss of attribute	**Fundamental (long term or permanent) changes to the marine environment, hydrology, or water quality, such as:** Wholesale changes to the sea bed, river channel, route, hydrology, or hydrodynamics. Development causes an increased runoff with flood potential. Significant changes to erosion and sedimentation patterns. Major changes to the chemistry or ecology of marine or surface receiving waters. Major changes to tidal flooding.
Moderate	Results in impact on integrity of attribute or loss of part of attribute	**Material but non-fundamental and short to medium term changes to the marine environment, hydrology, or water quality, such as:** Some fundamental changes to the sea bed, river channel, route, hydrology, or hydrodynamics. Development causes an increase in runoff within the drainage system capacity. Moderate changes to erosion and sedimentation patterns. Moderate changes to the chemistry or ecology of marine or surface receiving waters. Moderate changes to tidal flooding.
Minor	Results in minor impact on attribute	**Detectable but non-material and transitory changes to the marine environment, hydrology, or water quality, such as:** Minor or slight changes to the sea bed, river channel, route, hydrology, or hydrodynamics. Development causes slight increase in runoff well within the drainage system capacity. Minor changes to erosion and sedimentation patterns. Minor changes to the chemistry or ecology of marine or surface receiving waters. Minor changes to tidal flooding.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect the use/integrity	**No perceptible changes to the marine environment, hydrology, or water quality, such as:** No alteration or very minor changes to the sea bed, river channel, route, hydrology, or hydrodynamics. Development causes no / minor increases in runoff Very minor / no changes to erosion and sedimentation patterns. No pollution or change in chemistry or ecology of marine or surface receiving waters. Very minor / no changes to tidal flooding.

8.2.14 The sensitivity of the receiving environment, together with the magnitude of the impact, defines the significance of the potential effect, as identified within Table 8.3.

Table 8.3: Significance of Potential Effects

Magnitude of Impact	Very High	High	Medium	Low
Major	**Major**	**Major**	**Moderate**	Minor
Moderate	**Moderate**	**Moderate**	**Moderate**	Minor
Minor	Minor	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

8.2.15 The characteristics of the impacts are described in terms of direct/indirect, temporary (reversible)/permanent (irreversible), together with timescales (short, medium, long term).

8.3 Baseline Conditions

8.3.1 All potential sources of flooding have been considered and assessed in detail within the Flood Consequences Assessment provided at Appendix 8.1.

8.3.2 A summary of the sources of flooding and a review of the potential risk posed to the application area by each is presented within Table 8.4 of this document.

Table 8.4: Potential Risks Posed by Flooding Sources

Potential Source	Potential Flood Risk to Application Site(s)	Reason for Decision	Mitigation Required (Y/N)
Groundwater	No	Main groundwater is located at depth. Impermeable geology & concrete surfaces limit upward migration of groundwater. Unimpeded flowpaths exist into adj. docks for extruded groundwater.	No
Tidal	Yes	Flood Zones B & C2: The application area is located immediately adjacent to Barry Docks and is indicated to be partially affected by the tidal flood zone.	Yes
Fluvial	No	The plot is unaffected by fluvial flooding.	No
Infrastructure Failure	Flood Defences: No Raised Waterways: No Reservoirs: No	The property is remote from flood defences, raised waterways or reservoirs, the failure of which could lead to flooding.	No
Overland Flow (Pluvial)	No	NRW flood mapping indicates a **Very Low** risk from SW flooding.	No
Flooding from Artificial Drainage Systems	No	The flood risk from sewerage infrastructure is considered to be **Very Low.**	No
Site Generated Runoff (Wood Waste - Contaminated Areas)	Potentially	Whilst no material amendment to the site layout or surface finishings is proposed, full (contained) surface water management is proposed to prevent contamination of surface and tidal waters. This includes climate change consideration.	Yes

8.3.3 The marine and hydrological environments at the application area and its locale are considered in a number of sections:

- Marine setting: tidal receiving waters, water quality and flood risk.

- Hydrological setting: surface water features, flows and flood risk, quality and surface water management.

8.3.4 This information has been used to develop a conceptual site model to assess potential impacts associated with the proposed development. The same has also been used to determine appropriate mitigation measures.

Marine Setting

8.3.5 The application area is situated immediately adjacent to Barry Docks which connects with the Bristol Channel via a set of lock gates located c.1km south west.

Tidal Flood Data

8.3.6 National Resources Wales Flood Mapping (Technical Appendix 8.1; Figure 008) indicates the tidal floodplain to affect the southern and eastern boundaries of the application area with a **Low** to **High** associated flood hazard indicated and with further assessment required. Flood data has been requested from NRW which is awaited at the time of writing. In its absence, topographical analysis has been undertaken to establish the following flood levels:

- 200 year: 8.41m AOD
- 1000 Year: 8.50m AOD

8.3.7 This data is understood to incorporate updated climate change allowances in accordance with current UK guidance.

8.3.8 NRW Development Advice Maps indicate the application area to be located within Flood Zone B: *Areas known to have previously flooded.* The site access is partially affected by the outer margins of Flood Zone C2*: Areas without significant flood defence infrastructure.*

Coastal Flood Defences

8.3.9 Land immediately north east of the plot and south east of Number 2 Dock is indicated to benefit from TAN 15 Defended Zones for the sea (coastal flood defences) which are understood to provide a 200 year standard of protection. The Property does not benefit from these flood defences and is not at risk in the event of their failure.

8.3.10 The Barry Docks area is located within Shoreline Management Plan Policy Unit 20: *Lavernock Point to St. Anne's Head*. The policy intention in this locale is to enable the continued functioning of the docks by maintaining and upgrading existing structures.

Marine Water Quality

8.3.11 Review of the Natural Resources Wales bathing water quality data[1] indicates the nearest monitoring points to be situated at:

- Jacksons Bay (1km W): Records (2020-2023) indicate Sufficient water quality.
- Whitmore Bay / Barry Island (1.5km W): Records (2020-2023) indicate Good water quality.
- Watch House Bay (2.5km W): Records (2020-2023) indicate No Classification / Poor water quality.
- Cold Knap Barry (>3km W): Records (2020-2023) indicate Excellent water quality.

8.3.12 The marine water quality in the vicinity of the application area is indicated to be **Sufficient** to **Good**.

Environmentally Sensitive Receptors

8.3.13 Review of Defra's Magic website indicates the property to be within close proximity to the following ecologically sensitive or designated sites:

- SSSI: Hayes Point to Bendrick Rock (1.8km).
- SSSI: Jacksons Bay (1.6km).
- SSSI: Barry Island (2.5km).
- Marine Intertidal Substrate (Habitat): Mouth of Dock Gate (Mud / Shingle); Jacksons Bay, Barry Island (Sand / Shingle).
- Water Framework Directive Habitats – Lower Sensitivity: Gravel and Cobbles; Intertidal Soft Sediment, Rocky Shore, (mouth of Dock Gate, Jacksons Bay, Barry Island, Hayes Point to Bendrick Rock. Subtidal Rocky Reef (Severn Estuary).
- SPA Foraging Zone (Severn Estuary >5km east).
- Site of Importance for Nature Conservation: Cadoxton Wetlands.

8.3.14 No other ecologically sensitive or designated sites are located within a 1km radius of the property.

[1] https://environment.data.gov.uk/wales/bathing-waters/profiles/profile.html?site=ukl2202-36100

Hydrological Setting

Surface Water Features - Rivers

8.3.15 The principal watercourse within the vicinity of the property is the Cadoxton River which rises from the confluence of the Wrinstone Brook and Bullcroft Brook on the northern outskirts of Powys Village, near the hamlet of Michaelstone-le-Pit. From here it flows south west through Dinas Powys towards Barry. On reach Barry, the watercourse flows south west within an artificial channel towards the docklands, passing 470m south east of the application area before flowing into the Bristol Channel via a sluice at Bendricks, c.800m south west and on the opposite side of the Dock. This watercourse appears to be hydraulically separate from the application area.

8.3.16 Catchment descriptor information has been downloaded from the CEH Flood Estimation Handbook web data service, which is summarised in Table 005 of Technical Appendix 8.1. This indicates a small, heavily urbanised catchment, with elevated topographical relief, moderately permeable geology and medium average annual rainfall.

8.3.17 Flows within local watercourses are indicated to be predominated by subterranean flows (BFIHOST) with more minor contributions via overland flow (SPRHOST) and with a moderately low catchment response to incident rainfall anticipated. Notwithstanding the above, at a local level the catchment response to rainfall may be elevated by the presence of urban surfaces or less permeable overlying geology.

8.3.18 Review of Natural Resources Wales Flood Mapping for Rivers indicates the property to be unaffected by fluvial flooding from the Cadoxton River which is situated downslope of the property and on the opposite side of Barry Dock.

8.3.19 Review of the historic flood maps indicates there to be no records of historic fluvial flooding at the property or within the immediate locale.

Surface Water Features - Reservoirs

8.3.20 Review of the Natural Resources Wales Flood and Coastal Erosion Maps indicates the area to be unaffected by reservoir flooding, with no further assessment required.

Surface Water Features – Raised Waterways

8.3.21 The property is remote from raised waterways the breach or failure of which could lead to flooding.

Surface Water Features – Ponds / Wetlands

8.3.22 An area of marsh land, ponds and wetlands is present to the north west, north and north east which is understood to form the Cadoxton Wetlands Site of Importance for Nature Conservation (SINC). This comprises an area of restored wetland comprising tall herbs, scattered scrub and grassland habitat, together with two small lakes and a reedbed.

8.3.23 These features are indicated to be hydraulically separated from the property by natural and man-made topographical barriers, with no flowpath present for the conveyance of site generated runoff into these areas.

8.3.24 No further surface water features are indicated to be present within a 1km radius.

8.4 Development Proposals

8.4.1 Permission is sought for the change of use of existing industrial land for development of a Wood Processing Facility with access and associated infrastructure, including the following elements:

- Wood storage
- Processing area
- Lorry Parking

8.4.2 The following elements are already present within the property:

- Water Tank
- Office / store / welfare
- Weighbridge x 3
- Substation

8.4.3 The facility will have capacity for the processing of up to 250,000 tonnes of wood per year. Approximately 50% of the wood products created will be exported by boat.

8.4.4 The proposals are understood to involve no material change to the ground profile or surface finishes. The proposals are non-residential in nature, with an anticipated lifetime of <50 years.

8.5 Assessment of Effects

8.5.1 This section identifies the potential impact of the proposed development on the marine and hydrological environments. It also assesses the likelihood of occurrence of each identified impact.

8.5.2 Table 8.5 presents a summary of the unmitigated potential effects. The magnitude of potential impacts on marine and hydrological environments has been determined in accordance with Table 8.2.

Table 8.5: Summary of Potential Impacts Associated with the Proposed Development

Potential Receptor	Activities & Potential Impacts
Marine Environment (tidal flooding)	Flood risk to the wood processing plant / storage areas.
Surface water, hydrology & flooding	Increase in surface water runoff from existing impermeable / compacted surfaces, arising from climate change. Increased flood risk associated with contained storage (contaminated areas).
Marine and surface water quality	Pollution from wood leachate. Pollution from accidental spills or leaks of fuel, oil and site generated waste. Pollution from suspended materials (silts, sediments). Contaminated runoff from vehicle movement areas.

Tidal Flooding

8.5.3 The property is indicated to be affected by tidal flooding associated with Barry Docks and the adjacent Bristol Channel. Ingress of the southern parts of the property and a discrete section of the access road are indicated. Without mitigation, this could lead to flooding of the wood processing facility and its access impacting on personnel and equipment.

8.5.4 Maximum flood depths of 0.66m are indicated during a 200 year return period tidal flood event including climate change consideration, with flooding anticipated for c.90 mins around high water. Water depths increase to 0.75m for c.120 mins around high water during a 1000 year tidal flood event including climate change consideration.

8.5.5 The probability of impact is **Medium** to **High**, with a **Minor** to **Moderate** magnitude of impact to the facility owing to the presence of saline water which could impact plant and the depth of

flooding which could impact personnel. The sensitivity of the receptor is considered to be **Low**, accounting for the nature of development (industrial), to **Medium** (personnel).

8.5.6 Without mitigation, the overall significance of the risk to facility and its personnel from tidal flooding is therefore assessed to be **Negligible** to **Moderate**.

Surface Water Flooding

8.5.7 The facility has the potential to alter the local hydrological regime with the potential effects including:

- Increased rate of runoff, which may cause localised flooding.
- Uplift in rate and volume of runoff associated with climate change.

Off-Site Flooding – Clean Runoff

8.5.8 The surfaces finishes within the property are currently entirely impervious (concrete) and / or highly compacted, with no significant changes proposed. Site generated runoff currently discharges directly into the Dock via a combination of underground pipework / surface water outfall(s) and overland flow with no flowpaths present to third party land and with a **Negligible** risk of the proposed activities causing surface water flooding within downstream receptors (tidal).

Surface Water Flooding – Contaminated Runoff

8.5.9 Owing to the potentially contaminating nature of the Wood Processing operation and storage areas, all runoff generated by these elements of the facility will pass to a sealed system and will be entirely contained within the site, with no off-site discharges proposed.

8.5.10 Stored runoff will be recycled for use within on-site processes with residues tankered off-site for processing at the nearest Sewage Treatment Works, should the need ever arise.

8.5.11 Whilst no off site flooding will arise from the proposals, on site flooding may occur.

8.5.12 The probability of impact is **Medium** to **High**, with a **Negligible** to **Minor** magnitude of impact to the facility and its personnel arising from the presence of stored runoff (0.35m depth). The sensitivity of the receptor is considered to be **Low**, accounting for the nature of development (industrial), to **Medium** (personnel).

8.5.13 Without mitigation, the overall significance of the risk to facility and its personnel from surface water flooding is therefore assessed to be **Negligible** to **Minor**.

On-Site Flooding – Clean Runoff

8.5.14 Given the location of the property adjacent to the No. 2 Dock which outflows into the tidal Bristol Channel, it is considered that an unlimited discharge would be applicable for clean runoff.

Tide Locking

8.5.15 Investigation has been undertaken to establish the Mean High Water Springs tidal level, with this located at 6.81m AOD. The obvert level of the existing main (1200mm) outfall is located 0.44m above this (7.25m AOD) with tide locking considered unlikely. It is recommended that the discharge point include a flap valve at the outfall to prevent ingress in the event of elevated water levels within the adjacent Dock.

8.5.16 The probability of on-site surface water flooding is considered to be **Low** accounting for the presence of unimpeded overland flowpaths (7.85m AOD) for surcharged surface runoff into the adjacent docks.

8.5.17 The magnitude of impact arising from surface water flooding is considered to be **Negligible** accounting for there being no significant increase in runoff and with this well within the capacity of the receptor (Docks). The Sensitivity of the receiving environment is anticipated to be **Low** owing to the nature of the Dock (tidal). The significance of risk is therefore considered to be **Negligible**.

Water Quality

8.5.18 Within the wood processing facility there is a risk of contaminated runoff being generated from the following potential sources:

- Leaching of wood products into surface waters - generation of wood leachate.
- Accidental spillage of fuels and lubricants, from the vehicles moving around the site(s), e.g. drips, spills or vehicle collision.
- Suspended Sediments.
- Accidental spillage from fuel storage areas.

8.5.19 No overland flowpaths exist between the property and identified surface water receptors. However, a direct linkage is present into tidal receiving waters (Docks).

8.5.20 The magnitude of impact to surface waters is considered to be **Negligible**, accounting for the potential contaminant sources and the absence of hydraulic connection(s) between the property and surface water receptors.

Marine Receiving Waters - Wood Leachate

8.5.21 It is considered that, without mitigation, the probability of pollution arising from the discharge of wood leachate into surface runoff would be **Low** to **Medium** accounting for the nature of development, its size and the number of vehicles present within the facility.

8.5.22 The magnitude of impact to marine receiving waters arising from wood leachate is considered to be **Minor** to **Moderate**, accounting for the potential contaminant sources and the **Low** to **Very High** sensitivity of the receiving waters, e.g. marine in close proximity to SSSI designations stretching from Hayes Point to Barry Island; the presence of Marine Intertidal Substrate Habitat between the Dock Gate and Barry Island; Water Framework Directive Habitats (lower sensitivity) present between Hayes Point and Barry Island; and the location of the property within an SPA foraging zone for the Severn Estuary.

8.5.23 Without mitigation, the overall significance of risk to the quality of marine receiving waters is assessed to be **Negligible** to **Moderate**.

Marine Receiving Waters - Vehicle Movement Areas

8.5.24 The magnitude of impact to marine receiving waters arising from the accidental spillage of fuel oils, lubricants and other potentially contaminating liquids from vehicle movements within the property is considered to be **Minor** to **Moderate**, accounting for the potential contaminant sources and the **Low** to **Very High** sensitivity of the receiving waters.

8.5.25 Without mitigation, the overall significance of risk to the quality of marine receiving waters is assessed to be **Negligible** to **Moderate**.

Marine Receiving Waters - Suspended Sediments

8.5.26 It is considered that, without mitigation, the probability of suspended sediments arising from the wood processing facility would be **Low** owing to the nature of use (wood processing) and limited presence of sediments aside from those associated with compacted surfaces.

8.5.27 The magnitude of impact to marine waters would be **Minor** to **Moderate**, accounting for the potential sediment sources and the **Low** to **Very High** sensitivity of the marine receiving waters.

8.5.28 Without mitigation, the overall significance of the risk to marine water quality arising from the development is assessed as **Negligible** to **Moderate**.

Marine Receiving Waters - Fuel Storage Areas

8.5.29 It is considered that, without mitigation, the probability of occurrence of spillage of fuels, lubricants and other potentially contaminative liquids arising from fuel or chemical storage areas would be **Low** to **Medium** accounting for the number of vehicles that would be present within the wood processing plant.

8.5.30 The magnitude of impact to tidal receiving waters is considered to be **Minor** to **Moderate**, accounting for the potential contaminant sources and the **Low** to **Very High** sensitivity of the marine receiving waters.

8.5.31 Without mitigation, the overall significance of risk to the quality of marine receiving waters is assessed to be **Negligible** to **Moderate**.

Table 8.6: Summary of Unmitigated Potential Effects

Potential Impact	Impact Characteristics	Sensitivity of Receptor	Impact Magnitude	Potential Significance of Effect	Mitigation Required?
Tidal Flooding	**Tidal Flooding** Negative, Local, Direct, Reversible, Short Term.	Low – Medium	Minor - Moderate	Negligible – Moderate	Yes
Surface Water Flooding Increase in surface water runoff owing to the increased presence of impervious or highly compacted surfaces. Increased flood risk.	**Surface Water Flooding - Off Site** **Surface Water Flooding - On Site (Sealed)** **Surface Water Flooding - On Site (Clean)** Negative, Local, Direct, Reversible, Short Term.	Low - Medium Low	Negligible - Minor Negligible	Negligible - Minor Negligible	Yes No
Water Quality – Marine Environment Contaminated Runoff from Wood Processing Areas Contaminated runoff from vehicle movement areas. Pollution from suspended materials (silts, sediments). Pollution from accidental spills or leaks of fuel, oil and site generated waste.	**Wood Leachate** **Vehicle Movement Areas** **Suspended Sediments** **Fuel Storage Areas** Negative, Local, Direct, Reversible, Short - Medium Term.	Low - Very High	Minor - Moderate	Negligible - Moderate	Yes

Table 8.7: Summary of Mitigated Potential Effects

Potential Impact	Sensitivity of Receptor	Impact Magnitude	Potential Significance of Effect	Proposed Mitigation	Residual Impact Magnitude	Residual Significance of Effect
Tidal Flooding	Low - Medium	Minor - Moderate	Negligible - Moderate	Flood wall on dockside tying into higher ground either end.	Negligible	Negligible
Surface water flooding arising from >impervious areas ▪ Contaminated ▪ Clean	Low – Medium Low	Negligible - Minor Negligible	Negligible - Minor Negligible	Sealed storage: capacity to retain runoff for the 100 year 60 minute storm, accounting for climate change. Continued unlimited discharge (clean areas only) via existing outfall to docks.	Negligible Negligible	Negligible Negligible
Marine Water Quality Contaminated runoff from: ▪ Wood Leachate ▪ Vehicle movement areas – accidental spillage / leaks ▪ Suspended materials (silts, sediments). ▪ Fuel storage areas - accidental spills or leaks.	Low - Very High	Minor - Moderate	Negligible - Moderate	Full containment of runoff from wood processing plant. Best working practices for industrial sites accounting for EA/NRW Pollution Prevention Guidance. Traffic management systems / speed restriction. Plant fitted with drip trays. Routine maintenance and inspection (plant / SuDS). Water Quality Treatment Measures: Silt traps, baffles, settlement areas. Bunding / dual lining of fuel / chemical storage areas / pipework. Emergency pollution response plans and spillage kits. Ongoing management and maintenance of water quality mitigation measures as part of the site's management plan. Petrol interceptors serving clean areas.	Negligible	Negligible

8.6 Mitigation Measures

8.6.1 The above assessment has identified that mitigation measures are required to address the potential impacts associated with tidal & surface water flooding and water quality.

8.6.2 The mitigation measures proposed to address the potential impacts detailed in Table 8.6 are described below. These either reduce the likelihood of an event occurring or lessen the magnitude of the consequences if the event does occur. It should be noted that several of the mitigation measures proposed would have a positive effect on more than one potential impact.

8.6.3 A number of operational mitigation measures and best available techniques have also been incorporated into the scheme design, which would further reduce the potential risk to ground and surface water.

8.6.4 A summary of the mitigated potential effects is provided within Table 8.7.

Tidal Flooding

8.6.5 The following mitigation measures and operational practices are proposed to mitigate the potential effects of tidal flooding.

- Raising of all on-site controls, critical infrastructure (new elements of the development only) and entry points for services (gas / electricity / water) by 300mm above the maximum 200 year + climate change tidal flood level (e.g. to 8.71m AOD) to minimise any disruption caused by flooding.
- Location of all wood storage in areas of the site which are situated at 8.71m AOD or above. Where this is not possible, a concrete upstand should be input around those areas of wood storage and processing which are potentially affected by tidal flooding for design return period events e.g. surface elevations <8.41m AOD. This should be sealed to the concrete pad using a penetrative sealant and the blocks of the upstand should also be sealed together to prevent the ingress of floodwater. The crest of the upstand at the outer dockside should be located at 9.01m AOD, placing it 600mm above the current tidal flood level.
- Incorporation of flood resistant and resilient construction techniques within the design of those parts of the facility (particularly any elements which have not been raised) and which are potentially affected by flooding (e.g. at ground levels <9.01m AOD), to minimise water ingress in this event. This should apply up to 600mm above the tidal flood level (e.g. to 9.01m AOD), to minimise water ingress in the event of flooding. This design of these

measures should be suited to salt water environments. This mitigation only applies where additional built elements are proposed.

8.6.6 The following flood management measures are proposed to further ameliorate those residual risks which cannot be borne out by design:

- Preparation of a Flood Management Plan outlining the procedures to be followed in the event of flooding.
- Signing up to the NRW flood warning system to alert personnel to the potential for flooding and allow safe evacuation and execution of the Flood Management Plan.
- In the event of flood warning and / or flooding the facility will be subject to shut down / evacuation.

Safe Access

8.6.7 Safe access is achievable from the property via Ffordd y Mileniwm (Millennium Way). Where flooding is anticipated but has not yet occurred, personnel should evacuate north onto Ffordd y Mileniwm, then head west towards the roundabout with Gladstone Bridge, crossing Gladstone Bridge and heading north via Buttrills Road and linking into the A4050 via Barry Road. These roads are elevated; are unaffected by flooding throughout all return period events now and in the future; and link into the main arterial road network serving the area.

8.6.8 Safe refuge exists within the northern half of the property where ground levels are located >8.41m AOD and where c.75% of the plot is indicated to be unaffected by flooding. Where flooding has already occurred, personnel should execute the Flood Management Plan, evacuate to the northern section of the property and await further instruction from Natural Resources Wales and the emergency services.

8.6.9 The risks posed to site users will be minimised through the nature of site use and the predictability of tidal flooding.

8.6.10 With the above management and mitigation measures in place, the probability of tidal flooding occurring within the wood recycling facility is reduced to **Negligible** with the magnitude of the potential impact also reduced to **Negligible**. The sensitivity of receptors remains **Low** to **Medium**. The potential significance of this impact would therefore be reduced to **Negligible**.

Surface Water Flooding

Contaminated Runoff

8.6.11 Owing to the potentially contaminating nature of the Wood Storage and Processing Plant, all runoff from the concrete pad serving this area will be intercepted by open concrete drainage gullies and directed via these and surface contouring to a sealed storage area / sump present in the south western corner from where it is pumped into the large storage tank present on the south western boundary which has capacity for up to 1,110m^3 storage.

8.6.12 Under general rainfall conditions stored water will be filtered and re-used for wash down / dust suppression / on-site processes.

8.6.13 During periods of elevated or sustained rainfall, the system is designed to surcharge onto the concrete pad where it will be retained by two no. upstands present on the south eastern boundaries of the northern and southern areas of the wood storage and processing facility, respectively.

8.6.14 The northern and southern pad areas are located on either side of the on-site railway line. The containment wall serving the southernmost area will be sealed onto to the concrete pad using a penetrative sealant / adhesive to prevent the discharge of contaminated runoff into the dock. The upstand serving the northern area will be demountable to enable access to the dock where required. During day to day operations gaps will be left in the barrier serving the northern pad to enable vehicular access to both parts of the working site, with demountable barriers put in place during periods of sustained rainfall.

8.6.15 The crest levels of each wall would be set 300mm above the maximum anticipated water level within the storage area, although the height of the southern wall will also be governed by the tidal flood mitigation requirements. This configuration will retain runoff from the northern and southern parts of the facility, respectively and ensure no flooding of the railway line from surface runoff.

8.6.16 These areas are designed to retain surcharged runoff with capacity present to accommodate runoff for return period rainfall events up to and including the 100 year 60 minute duration storm, accounting for climate change.

8.6.17 Safety factors are incorporated within the surface water storage calculations to allow for successive rainfall, fluctuations in flow and flood levels, climate change sensitivity and losses in efficiency associated with sedimentation.

8.6.18 With the above surface water management and mitigation measures in place to ensure that runoff is retained, in combination with rainwater harvesting for re-use of runoff and removal of residues for off-site processing, the probability of surface flooding occurring within the wood recycling facility is reduced to **Negligible** with the magnitude of the potential impact also reduced to **Negligible**. The sensitivity of receptors remains **Low** to **Medium**. The potential significance of this impact would therefore be reduced to **Negligible**.

Water Quality

Contaminated Runoff – Wood Leachate

8.6.19 Owing to the potentially contaminating nature of the Wood Processing Plant all runoff generated by this facility will pass to a sealed system. Stored runoff will be recycled for use within on-site processes with residues tankered off-site for processing at the nearest Sewage Treatment Works should that be necessary. No off site discharge is proposed from wood storage or processing areas. This will prevent potential detrimental impacts to downstream receptors, including groundwater, local watercourses and coastal areas.

8.6.20 With the above surface water management and mitigation measures in place, the probability of off site surface water contamination occurring from the wood recycling facility is reduced to **Negligible** with the magnitude of the potential impact also reduced to **Negligible**. The potential significance of this impact would therefore be reduced to **Negligible** accounting for the absence of receptors.

Fire Water

8.6.21 Principal areas of the property which are at elevated risk of fire discharge runoff into the sealed drainage network. This would limit the potential for off-site discharges / pollution incidents in the event of fire.

Clean Areas

8.6.22 An existing surface water management system is present within the property which will be audited / upgraded to incorporate appropriate pollution prevention, control and mitigation measures.

8.6.23 Separate systems will drain clean runoff from rooves (modular buildings) and potentially contaminated runoff from clean hardstanding and working areas.

8.6.24 The following mitigation measures and operational practices are proposed both to limit the probability of a pollution incident occurring in the first instance and to mitigate contamination, where it does:

- Given the presence of heavy plant and machinery within the wood processing facility, best working practices should be adopted and measures to protect the water environment including those set out within the Natural Resources Wales's Pollution Prevention Guidance.
- All plant should be fitted with drip trays to minimise drips, leaks and minor spills of hydrocarbons and lubricants.
- In accordance with PPG02, all on site fuel and chemical storage would be bunded, or if stored below ground, contained within double skinned tanks.
- Any underground fuel or chemical piping would be either double skinned or laid within concrete ducts.
- Emergency spill response kit(s) would be maintained within the site(s).
- A vehicle management system / road markings and speed restrictions would be put in place, wherever, possible to reduce the potential for conflicts between vehicles and thereby reduce the risk and significance of any collision event.

8.6.25 Potentially contaminated runoff from the clean areas of the plant, roads and hardstanding will discharge to the existing surface water outfall via the following water quality treatment measures, designed in accordance with the requirements of the SuDS Manual section 4 (Table 4.3) and Section 26 (Tables 26.2 and 26.3):

- Porous Surfaces: Runoff to be intercepted at source and passed through the sub-base which will drain to filter drains / permeable pipes located at the perimeter for onward release to downstream receiving waters. The porous surfaces will slow runoff and encourage sediment deposition upstream of the outfall. Hydrocarbons present will be removed through adsorption, adhesion and microbial processes within the underlying sub-base.
- Oil Separator (existing): Situated upstream of the outfall and sized to accommodate the upstream impervious catchment area. Removal of residual silts, suspended solids and hydrocarbons from runoff.

8.6.26 The above surface water management and water quality mitigation measures will prevent potential detrimental impacts to water quality, ensuring that only clean water is discharged.

8.6.27 The incorporation of the above pollution prevention, management and mitigation measures reduces the probability of accidental spillage of fuels, lubricants and other potentially contaminative liquids to **Low** and the magnitude of the potential impact to **Negligible**. The sensitivity of receiving waters remains **Low** to **Very High**. The potential significance of this impact would therefore be reduced to **Negligible**. This applies to both vehicle movement and fuel storage areas.

8.7 Residual Effects

8.7.1 It is considered that with the incorporation of the proposed mitigation measures (see Table 8.7), no significant residual impacts on surface water or ground water quality or flooding would arise from development proposals.

Management and Maintenance

8.7.2 Good site practice along with appropriate, routine management and maintenance of the proposed flood and surface water mitigation and management systems and water quality treatment measures will be critical to ensuring their continued efficiency and effectiveness and the extension of their lifetime.

8.7.3 It is therefore proposed to incorporate a number of operational practices to ensure that the surface water system performs efficiently. These measures would include:

- Routine inspection and repair of flood mitigation measures.
- Routine monitoring of the efficiency of the surface water management and water quality treatment systems by site operator).
- Removal and disposal of accumulated sediment and debris from surface water management networks.
- Periodic cleansing of sealed storage tank and water quality treatment measures, including petrol interceptors / oil separators.

8.7.4 With appropriate processes in place for the ongoing management and maintenance of the flood and surface water mitigation and management systems and water quality treatment measures, it is considered that the residual risks can be appropriately mitigated.

8.8 Cumulative Effects

8.8.1 It is considered that there would be no cumulative effect on the water environment since the proposed mitigation measures seek to ensure the development would have no negative impact on the water environment beyond the site boundary(ies).

8.9 Conclusions

8.9.1 The marine and hydrological regimes within the application area and its immediate locale have been assessed with reference to information held by the BGS, Natural Resources Wales, the Lead Local Flood Authority and others, and the consideration of site specific investigations and reports.

8.9.2 A Flood Consequences Assessment has been completed which confirms the application area to be partially affected by tidal flooding. A copy of this document is located at Appendix 8.1.

8.9.3 The principal environmental effects identified for the proposed development comprise potential increased risk of tidal and surface water flooding and detrimental impacts to water quality.

8.9.4 The potential impacts of the proposed development on the marine and hydrological environments have been identified and assessed, and where appropriate, mitigation measures have been accommodated into the design to reduce identified risks to flood risk and / or water quality at the site and within downstream receptors throughout the anticipated development lifetime, in accordance with TAN-15.

8.9.5 Management measures are proposed to further reduce those identified residual risks to / from flooding and water quality which cannot be borne out by design.

8.9.6 The requirements of Local Planning Policy and Technical studies have also been accounted for within this assessment.

8.9.7 All aspects of development would be undertaken in accordance with best practice guidance.

8.9.8 It is duly presented that, with respect to the marine and hydrological environments, including consideration of flood risk and water quality, and accounting for the proposed mitigation measures, no significant residual impacts would arise from the proposed development.